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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,097	03/31/2004	John S. Sadowsky	1000-0033	6563

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EXAMINER	
TRAN, KHANH C	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/815,097

Applicant(s)

SADOWSKY ET AL.

Examiner

KHANH C. TRAN

Art Unit

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,6,8-13,15-20 and 25-33 is/are rejected.
- 7) ☒ Claim(s) 2-4,7,14 and 21-24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/31/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. The Amendment filed on 1/15/2008 has been entered. Claims 1-33 are still pending in this Office action.

Response to Arguments

2. Applicant's arguments with respect to claims 1-6, 8-13, 15-22 and 26-33 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 5-6, 8-13 and 26-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada et al. U.S. Patent Application Publication No. US 2002/0003773 A1 (previously cited) in view of Yoshida U.S. Patent 7,254,179 B2.

Regarding claim 1, in paragraph [0090], referring to FIG. 12, Okada et al. discloses an OFDM transmitter 1 comprises a first channel encoder 2-1, a second channel encoder 2-2, a third channel encoder 2-3, a synchronism control section 3, a first frequency converter 4-1, a second frequency converter 4-2, a third frequency converter 4-3, a multiplexer 5, an IFFT operating circuit 6, an guard interval adder 7, an

orthogonal modulator 8, a frequency converter 9 and an antenna 10. In paragraph [0098], the frequency converter 4-1 further comprises a phase shifter 11, a phase angle generator 12 and an accumulator 13. The phase shifter 11 provides subcarrier dependent phase shifts to orthogonal modulator as shown FIG. 12.

Okada et al. does not disclose subcarrier dependent phase shifts selected to convert a wireless channel as set forth in the application claim.

Yoshida discusses in column 1 lines 25-40, in wideband wireless communications, frequency-selective, or multipath fading is a particular problem as it degrades channel quality. *Multicarrier modulation is an effective technique to combat multipath fading.* In this modulation scheme, ***the transmission bandwidth is divided into a plurality of carriers (called subcarriers) to utilize the frequency diversity in a frequency-selective fading environment*** and thereby enable high-quality wireless transmission.

Because Okada et al. teachings are directed to utilization OFDM subcarriers to be used for digital broadcasting, therefore, one of ordinary skill in the art at the time the invention was made would have recognized that Okada et al. teachings converts channel multipath fading into a frequency-selective fading environment.

Regarding claim 5, in paragraphs [0098] – [0099], Okada et al. further discloses that the quantity of frequency shift represents the difference between the center frequency of the RF frequency band of each information channel and the center

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frequency of the RF frequency band of the multiplexed signal for connected transmission.

Regarding claim 6, for frequency selective case, because the channel bandwidth must be greater than coherence bandwidth (by definition), in view of that, the amount of phase shift is based on an approximate coherence bandwidth associated to the OFDM transmitter 1.

Regarding claim 8, claim is rejected on the same ground as for claim 1 because of similar scope. Furthermore, referring to FIG. 12, OFDM transmitter 1 includes frequency converters 4-1 4-2 4-3, wherein each includes a phase shifter as disclosed in paragraph [0098].

Regarding claim 9, OFDM transmitter 1 further includes an IFFT operating circuit 6.

Regarding claim 10, claim is rejected on the same ground as for claim 8 and further in view of claim 9 because of similar scope.

Regarding claim 11, in paragraph [0100], see FIG. 13, the phase angle generator 12 generates a phase angle by using equation (1) that shows the linear relationship between the phase shift and the frequency of the channel.

Regarding claim 12, referring to paragraph [0102] – [0103], see FIG. 13, Okada et al. teaches the phase angle is further inputted to an accumulator 13, which could add a phase shift that is nonlinearly related to the frequency of the channel.

Regarding claim 13, claim is rejected on the same ground as for claim 6 because of similar scope.

Regarding claims 26, claim is rejected on the same ground as for claim 1 because of similar scope.

Regarding claim 27, FIG. 12 further discloses frequency converter 9 between guard interval adder 7 and antenna 10.

Regarding claim 28, FIG. 12 further discloses guard interval adder 7.

Regarding claim 29, claim is rejected on the same ground as for claim 1 because of similar scope.

Okada et al. does not disclose a computer readable storage medium having instructions as set forth in the application claim.

Nevertheless, one of ordinary skill in the art at the time the invention was made would have been motivated to implement a computer readable storage medium having instructions to carry the steps for the simulation and testing purposes.

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Regarding claim 30, claim is rejected on the same ground as for claim 2 because of similar scope.

Regarding claim 31, claim is rejected on the same ground as for claim 12 because of similar scope.

Regarding claim 32, claim is rejected on the same ground as for claim 1 because of similar scope.

Regarding claim 33, claim is rejected on the same ground as for claim 6 because of similar scope.

4. Claims 15-20 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Menon et al. U.S. Patent 6,940,917 B2.

Regarding claim 15, in column 12 lines 35-67, Menon et al. teaches in FIG. 3 a transmitter unit 300 including a channel interleaver 314 then interleaves the coded bits based on one or more interleaving schemes to provide time, spatial, and/or frequency diversity. A symbol mapping element 316 then maps the interleaved data in accordance with one or more modulation schemes (e.g., QPSK, M-PSK, M-QAM, and so on) to provide modulation symbols. Further in FIG. 4, block 340a separates the input data stream into N spatial stream.

Menon et al. does not show the channel interleaver separating the input data stream as set forth in the application claim.

However, as recited above, because a channel interleaver 314 then interleaves the coded bits based on one or more interleaving schemes to provide time, spatial, and/or frequency diversity, one of ordinary skill in the art at the time the invention was made would recognize that the combination of channel interleaver 314, symbol mapping 316 and signal scaling 340 (shown in FIG. 3) perform equivalent function of the claimed interleaver.

Referring to FIG. 4, in column 13 lines 35-60, transmitter unit 300 further includes beam-steering unit 450 performing beam-steering for an associated subband and also receives the normalized steering vector $e(k)$ for that subband. Further taught in column 6 lines 5-15, Menon et al. discloses the beam-steering technique generates one transmit vector $x(k)$ for each subband, with the elements of $x(k)$ having the same magnitude but possibly different phases.

Menon et al., in column 1 lines 35-50, discusses the spatial subchannel(s) of a wideband MIMO/MISO system may encounter different channel conditions due to various factors such as fading and multipath. Each spatial subchannel may experience frequency selective fading, which is characterized by different channel gains at different frequencies of the overall system bandwidth. Because Menon et al. teachings are directed to utilization spatial OFDM subchannels, therefore, one of ordinary skill in the art at the time the invention was made would have recognized that Menon et al.

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teachings converts channel multipath fading into a frequency-selective fading environment.

Regarding claims 16-17, referring to FIG. 4, the transmitter includes antennas 224a ... 224t, in which each path further includes an IFFT.

Regarding claim 18, referring to FIG. 4, the number of antennas corresponds to the number of spatial stream.

Regarding claim 19, FIG. 4 discloses beam-steering units 450a ... 450f and combiners (antenna) 460a ... 460t. In light of that, the number of substreams and the number of antennas might not be the same.

Regarding claim 20, Menon et al. teachings apply to MIMO-OFDM system; see column 2 lines 60-67.

Regarding claim 25, the claimed subject matter has been addressed in claim 15 rejection.

Allowable Subject Matter

6. Claims 2-4, 7, 14 and 21-24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHANH C. TRAN whose telephone number is (571)272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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KCT

*/KHANH C. TRAN/
Primary Examiner, Art Unit 2611*